

No. 4. — *Characters and Relations of Gallinuloides wyomingensis*
Eastman, a Fossil Gallinaceous Bird from the Green River
Shales of Wyoming. By FREDERIC A. LUCAS.

THE specimen upon which the following observations are based was discovered in the Green River Shales (Middle Eocene) of Fossil, Wyoming, during the summer of 1899, and was shortly after procured for the Museum of Comparative Zoölogy at Cambridge, where it is now preserved (Cat. Foss. Birds, No. 1598). Dr. C. R. Eastman briefly described (Geological Magazine, February, 1900) the bird as *Gallinuloides wyomingensis*, and at his solicitation a more detailed investigation of its structure and relations was undertaken, the results of which are herein set forth.

Like the well-known Green River fishes, the specimen is very complete and in a most excellent state of preservation, although a little injured as to skull, vertebræ, and digits through the over-zealous preparation of the collector. There is a thin, dark, unctuous layer lying on the same plane as the skeleton and almost confluent with the thinner bones, so much so that in developing the finer points it was at times difficult to shun the temptation to carve out a character that might readily be imagined to exist. This layer obscures the ribs, which are scattered, as well as other portions of the skeleton. While, however, many structural details cannot be made out, the general characters are so distinct and the affinities of the bird so apparent that these defects are of comparatively small importance.

The Green River bird was of about the size of a Ruffed Grouse, but stood somewhat higher on its legs. Its galliform nature is obvious at a glance, the most apparent peculiarities being the length of the legs and the depth and the anterior extent of the sternal keel. The majority of its structural resemblances are with the curassows and with the genus *Ortalis* amongst those birds, but while according to Huxley's definition it indisputably falls in the Peristeropodes, there are sufficiently strong characters to exclude it from both the Cracidæ and Megapodiidæ. The bird presents no points of affinity with any of the American grouse, still less with any of the Odontophorinæ.

Cracine and Galline are herein used as short equivalents for "peristeropodous" and "alectoropodous," — the latter terms, although expressing the precise meaning needed, being a trifle cumbersome for ordinary use; "galliform" is employed to designate such characters as are shared in common by all members of the Galliformes.

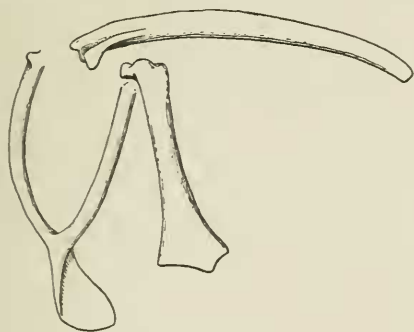
Head. — The beak much resembles that of *Ortalis*, being moderate in size, stouter than in *Crax*, *Rollulus*, and *Phasianus*; but not so short, stout, and decurved as in *Colinus* and allied genera. The holorrhinal opening is also much like that of *Ortalis*, and the nasal, which has escaped injury, is typically galliform; the superior process can be clearly seen, but the inferior process is covered on its lower part by crushed bone. The lachrymal, or prefrontal, appears to have been well developed, contrasting in this respect with the American grouse (in which the prefrontal is usually quite small), and agreeing with the curassows. The post-frontal process is stout and directed forwards. The mandible is stout and imperforate, and while it has a blunt angular projection, the recurved process so characteristic of the Galliformes is lacking. This is the most notable departure from the galliform structure found in the skeleton.

Vertebræ and Ribs. — Little can be said of the vertebræ save that the vertebral column presents the customary galliform arrangement of a free vertebra in front of the synsacrum preceded by a mass of ankylosed vertebræ, but as to the number of the latter nothing can be affirmed. The cervicals have suffered from the mistaken zeal of the preparator, and but five can be definitely distinguished between what should be the axis and where the column disappears in the flattened bones of the wings. The caudals are mostly lacking, so that, unfortunately, nothing can be learned from them.

Four pairs of ribs are articulated with the sternum, and at least one pair (one is the customary number in the Galliformes) arose from the synsacrum. Several ribs lie over the synsacrum, but there is no reason to suppose that all of them articulated with it. The usual number of ribs among the Galliformes is five on a side; *Pavo* has six, but the number in the present specimen cannot be made out. There is quite a little space between the first and second costal facets, the succeeding three being crowded together. This is interesting from the fact that it is a feature of modern galline birds, the spacing of the costals being more regular among the curassows.

Shoulder Girdle. — The scapula is not unlike that of *Rollulus*, being long, narrow, and with parallel borders, as in many of the curassows, or

as in *Pediocetes*. The coracoid resembles that of the Old World pheasants, and especially that of *Phasianus colchius*, more than it does the corresponding bone in any of the curassows. The epicoracoid is a little more angular than is customary among Galliformes, but the epicoracoid of *Pediocetes* is of much the same pattern, and in this small point the Green River bird makes its nearest approach to some of the American grouse. The precoracoid process appears to be absent, as it is in most Galliformes, although there is a suggestion of this process in *Arboriphila*. The scapular process is small. The distal end of the coracoid makes a more obtuse angle with the shaft than is usual even in galline birds, but in this respect it is very similar to *Phasianus colchius*.



Scapula, coracoid, and furcula, natural size.

The furcula is unusually short and stout for a gallinaceous bird, exceeding in this respect any species with which it has been compared; it is U-shaped rather than V-shaped, most nearly resembling *Numida* in this particular. There is a distinct though slight acrocoracoid process, so that the furcula did not merely rest against the inner side of the coracoid, but articulated with it, thus differing from all existing Galliformes. The scapular ends of the furcula are hidden so that it cannot be positively stated whether or not they reached the scapula. The hypocleidium is large and triangular, contrasting with *Crax*, which has a spinous hypocleidium, and exceeding *Ortalis*, in which this process is subtriangular and of moderate size.

The sternum has a manubrium of moderate size, but from the disposition of the bones it is impossible to ascertain whether it is perforate or imperforate. Both the external clefts are quite deep, and the external as well as internal xiphoid process is directed well backward; both